

C & S WASTE OIL
SCD 982 119 315

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TABLE OF CONTENTS

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	<u>Page</u>
I. INTRODUCTION/EXECUTIVE SUMMARY	4
II. SITE BACKGROUND AND HISTORY	5
A. Ownership History	5
B. Site Location and Description	5
C. Regulatory History	6
D. Process and Waste Disposal History	6
E. Removal/Remedial Actions	7
F. Demography/Regional Setting	7
III. FIELD INVESTIGATIONS	7
A. Inspection and Sampling Activities	7
B. Sample Types and Locations	8
C. Analytical Results	10
IV. GROUNDWATER PATHWAY	14
A. Regional Hydrogeology	14
B. Groundwater Use	14
C. Groundwater Impact	15
V. SURFACE WATER PATHWAY	16
A. Regional Characteristics	16
B. Surface Water Use	16
C. Surface Water Impact	16
VI. AIR PATHWAY	17
VII. ON-SITE EXPOSURE PATHWAY	17
A. Direct Contact	17
B. Fire and Explosion Mode	17
VIII. CONCLUSIONS AND RECOMMENDATIONS	17
IX. REFERENCES	20
X. APPENDICES	
Appendix A	22
Appendix B	23

XI. TABLES

TABLE 1:	Sampling Location, Description and Rationale	8
TABLE 2:	Summary of Soil Sample Analytical Results	11
TABLE 3:	Summary of Private Well Samples Analytical Results	13
TABLE 4:	Summary of Waste Sample Analytical Results	14
TABLE 5:	Population Distribution Estimates	17

Page

I. INTRODUCTION/EXECUTIVE SUMMARY

C & S Waste Oil was a hazardous waste transporter for approximately twenty years (1963-1983). Upon the death of Columbus Shaffer, (or shortly thereafter), C & S Waste Oil operations ceased and the site was abandoned. Tanker-trailers, cylinders, underground storage tanks, above ground storage tanks and numerous drums have been observed at the site.

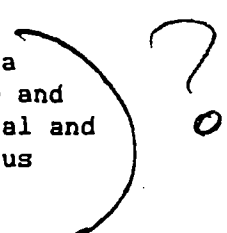
Although the contents of the partially filled containers and various types of hazardous wastes transported by C & S Waste Oil are unknown, laboratory analyses of soil samples collected from the site suggest that a variety of polynuclear aromatic hydrocarbons, heavy metals, volatile organics and base-neutral/acid extractable compounds were among the wastes transported by C & S Waste Oil. Aroclor-1260, a distillation cut of polychlorinated biphenyl (PCB), and dichlorodiphenyltrichloroethane (DDT) are also among the contaminants detected in on-site soil samples.

The detection of trichloroethane and tetrachloroethene in on-site soil samples and in a downgradient well suggests that hazardous wastes may have migrated from the site into the groundwater aquifer. An estimated 1,873 people living within three miles of the C & S Waste Oil Site are dependent upon the interconnected saprolite and bedrock aquifer systems as a source of drinking water. Although the observed groundwater contamination can not be directly attributed to the site without further groundwater study, the migration of hazardous substances into the groundwater aquifer poses a possible health threat to domestic well users within the area.

Uncontrolled access to the site and the development of an auto parts store at the site increases the possibility of direct contact with hazardous materials and substances. An estimated 786 people live within a one-mile radius of the site.

The impact of contaminants on air and surface water is unknown. However, the potential for air contamination may exist due to the volatile nature of the waste. Additionally, surface runoff may potentially impact a small tributary of the South Tyger River.

The C & S Waste Oil Site has been given a medium priority for a Listing Site Inspection (LSI) because further evaluation of on-site and off-site contamination needs to be conducted to determine if remedial and removal actions are necessary to prevent further release of hazardous substances into the environment.



II. SITE BACKGROUND AND HISTORY

A. Ownership History

Present Owner: Gary Hammond
1305 Bushy Creek Road
Taylors, South Carolina 29687
Phone: (803) 244-6479
(1988 - present)

Present Operator: Hilltop Auto Parts
Route 6, Hwy 290
Greer, South Carolina 29651
(1989 - present)

Previous Owners: Raymond Shaffer
Route 2, Box 120-D
Landrum, South Carolina 29356
(1985 - 1988)

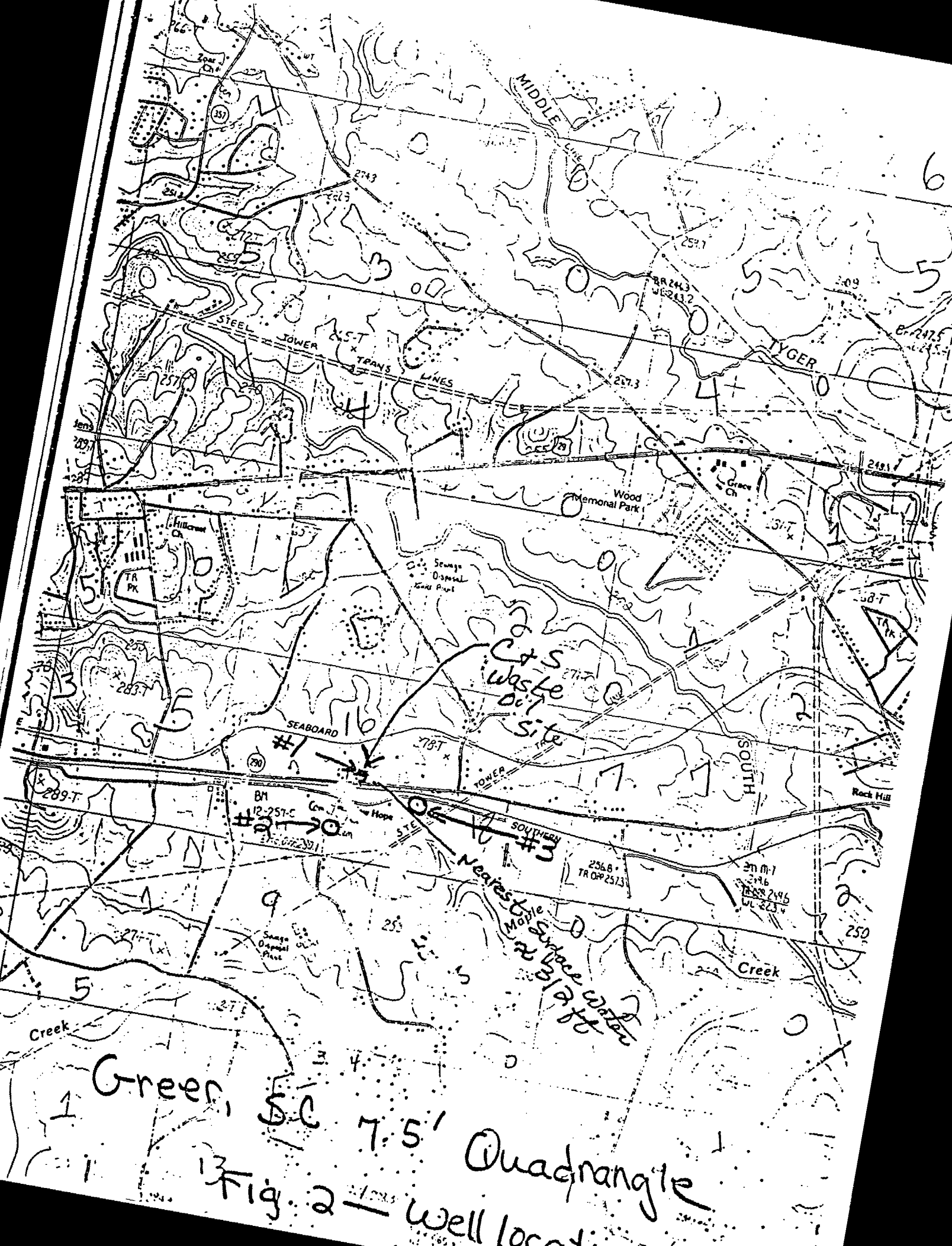
Estate of Haud Columbus Shaffer
Ruth Smith, Administratrix
Attorney: James C. Cothran, Jr.
Suite 201 Spartan Centre
101 West St. John Street
Spartanburg, South Carolina 29301
(803)585-4273
(Years of ownership are not known)

Previous Operator: C & S Waste Oil
Route 6, Highway 290
Greer, South Carolina 29356
(Ref. 1).

B. Site Location and Description

The C & S Waste Oil Site is located approximately 2.6 miles east of the intersection of S.C. Highway 290 and S.C. Highway 14. The site is positioned on the north side of S.C. Highway 290 (Ref. 2). Geographically, C & S Waste Oil is positioned at 34 degrees, 56 minutes, 07.6 seconds north latitude and 082 degrees, 11 minutes, 13.8 seconds west longitude (Ref. 2).

The C & S Waste Oil Site consisted of three dilapidated houses, one abandoned service building, forty to sixty rusty drums and containers, two underground storage tanks, two large above ground tanks, three tanker trailers and numerous areas of stained soil. The unfenced site is approximately two to three acres and is located adjacent to S.C. Highway 290. A proportional site sketch is attached in Appendix A.



C. Regulatory History/RCRA Summary

The South Carolina Department of Health and Environmental Control (SCDHEC) issued C & S Waste Oil a transporter permit (SCW101894400) on August 22, 1983. The transporter permit was deactivated prior to its expiration date which was possibly due to the death of Columbus Shaffer. A business card found at the site indicates that C & S Waste Oil was U.S. EPA transporter permitted. Transporters of hazardous waste are not subject to RCRA permitting requirements provided that hazardous waste is stored on site for less than ten days (Ref. 19).

Information is not available to evaluate the C & S Waste Oil compliance with the transporter regulations. No additional regulatory history is known.

D. Process and Waste Disposal History

C & S Waste Oil hauled waste oil from North Carolina, South Carolina and Georgia for approximately twenty years (1963-1983) according to William Buffington a former Appalachia III District Consultant with SCDHEC (Ref 16). However, documentation of waste hauling activities conducted by C & S Waste Oil is not available in SCDHEC or U.S. EPA files. Therefore, the companies C & S Waste Oil provided transporter services to and the sites utilized for waste disposal are unknown. Additionally, the number of tanker trailers and other vehicles used to transport waste and the amount of waste stored and released at the site are unknown.

During a field investigation conducted on October 9, 1985, Robert L. Fairey, III (SCDHEC) observed the following tanker trailers and storage containers at the C & S Waste Oil Site:

1. Two, 2,000-gallon delivery truck tanks.
2. One, 8,000-gallon tank trailer.
3. One, 6,000-gallon cylindrical storage tank (rusty).
4. One, 10,000-gallon cylindrical storage tank (rusty).
5. 40 to 60, 55-gallon drums.

Additionally, two underground storage tanks were observed during a Site Screening Investigation (SSI). The aforementioned tanker trailers, tanks and drums give an indication of the method in which C & S Waste Oil transported and stored hazardous waste.

Although the types of hazardous waste transported by C & S Waste Oil are unknown, laboratory analyses of samples collected from the site have shown various concentrations of ethenylbenzene, bicyclo (4.2.0) octa-1,3,5-triene, PCB's (Aroclor-1260), DDT, DDE, polynuclear aromatic hydrocarbons, volatile organics and heavy metals. A summary of analytical results is given in Section III of this report.

E. Removal/Remedial Actions

No emergency or remedial actions have occurred at the C & S Waste Oil Site. However, the current property owner has removed and/or sold the majority of containers and equipment abandoned at the site. It is unknown where drums and containers of waste materials were taken or who the containers were sold to. According to John Cresswell of SCDHEC-Site Screening Section, the current property owner was granted permission to salvage scrap metal from empty drums and containers. However, SCDHEC did not grant the owner permission to remove containers containing waste materials (Ref 20).

F. Demography/Regional Setting

C & S Waste Oil is located approximately 1.5 miles east of Greer, South Carolina. Although Greer, South Carolina is the only urbanized city within four miles of C & S Waste Oil, the region contains numerous residential communities and townships. Greer is located between Spartanburg and Greenville, which are two large metropolitan cities. The close proximity of Greer to Spartanburg and Greenville adds to Greer's growth potential. Based on 3.8 people per household and information derived from USGS topographic map and US Census figures, approximately 20,909 people reside within three miles of the site, and 31,756 people reside within four miles of the site (Ref. 2,3). Several schools are located within three miles of the site. Kindergartens and daycare centers are located within three miles of C & S Waste Oil; however, their exact locations are unknown.

Land Uses within three miles of the site include commercial, industrial, residential and agricultural usages. The nearest commercial/industrial development is located approximately 702 feet west of the site (Ref. 2). Farmland maps published by the U.S. Department of Agriculture indicates that approximately 55 acres of prime agricultural land are located 400 feet south of the site (Ref. 4). According to Charles H. Gray, County Extension Agent for Spartanburg County, farmland within four miles of the C & S Waste Oil is primarily pastures used for cattle grazing (Ref. 5).

III. FIELD INVESTIGATIONS

A. Inspection and Sampling Activities - CERCLA/SARA Program

On January 24, 1989, a reconnaissance site visit was conducted at the C & S Waste Oil Site. SCDHEC personnel participating in reconnaissance activities included Gerald Stewart (Coordinator), Judy Canova, Tommy Hyde, Gerald Shealy, Phil Morris, and Cindy Mason. During the site reconnaissance, SCDHEC personnel observed the condition of the site, gathered information concerning previous owners and past waste handling practices, performed a visual inspection of the surrounding areas to locate potential sampling points, and video recorded and sketched (unscaled) the site layout (Ref. 17).

On February 8, 1989, the following SCDHEC personnel conducted sampling activities at the C & S Waste Oil Site:

Gerald Stewart - Site Screening Section, Coordinator
Harold Seabrook - Waste Assessment Section
Gerald Shealy - Site Safety Officer
Carl Adams - Emergency Response Section
Howard Moseley - Waste Assessment Section
Judy Canova - Superfund Section, Hydrogeology
Tommy Hyde - District Hydrogeologist.
Norman Shumard - Administration
Hudson Waller - Administration

Upon arrival at the site, the site inspection team met with the property owner, Mr. Gary Hammond, to explain the purpose of the visit and to show Mr. Hammond the proposed sampling locations. Mr. Hammond was given, but rejected, the option to split samples (Ref. 18).

The weather conditions were partly sunny with temperatures in the 40's to 50's during sampling activities. The sampling team dressed in a modified level D, which included topped boot covers and gloves. No field measurements were taken during sampling activities. Prior to the sampling inspection, the property owner had removed numerous drums and containers from the site and cut over-grown vegetation.

B. Sample Types and Locations

The following table gives a description of the samples actually collected, sample locations and rationale for collecting sample.

Table 1: Sampling Location, Description and Rationale

<u>Sample Number</u>	<u>Type</u>	<u>Location/Description/Rationale</u>
CS-SB-01	Soil	<u>Location:</u> Background soil sample collected S-S.W. of the site across Hwy 290 in the woods before railroad track. <u>Description:</u> Soil texture changed from black/brown granular sand with clay nodules (0-4") to reddish-orange clay at depth greater than 4". <u>Rationale:</u> Sample was collected to determine the background constituents of the soil at this location.
CS-SB-02	Soil	<u>Location:</u> Sample was collected from a stained soil area located on the east side of the service building. Several drums were stored near this sampling area (composite sample).

Table 1: Sampling Location, Description and Rationale
(Continued)

<u>Sample Number</u>	<u>Type</u>	<u>Location/Description/Rationale</u>
CS-SB-02 (cont.)		<p><u>Description:</u> Soil texture ranged from black/brown granular sands to yellow, brown and black tar-like material at the point of sampling (0-2").</p> <p><u>Rationale:</u> Sample was collected to determine the hazardous constituents in on-site soil at this location.</p>
CS-SB-03	Soil	<p><u>Location:</u> Sample was collected from a drum storage area located on the west side of the property (halfway between front and rear). Composite sample.</p> <p><u>Description:</u> Soil texture ranged from reddish-orange sands to reddish-orange clayey topsoil at the point of sampling (0-2").</p> <p><u>Rationale:</u> Sample was collected to determine the hazardous constituents in on-site soil at this location.</p>
CS-SB-04	Soil	<p><u>Location:</u> Sample was collected from an area of stained soil located at the northend of the site. The Old Gulf tanker was originally stored in this sampling area.</p> <p><u>Description:</u> Soil texture ranged from black sands to red clayey sands at the point of collection (0-2").</p> <p><u>Rationale:</u> Sample was collected to determine the hazardous constituents in on-site soil at this location.</p>
CS-SB-05	Soil	<p><u>Location:</u> Composite soil sample collected from the east middle region of the site where the Gulf tanker is presently located. Large region of stained soil.</p> <p><u>Description:</u> Soil texture ranged from orange clayey sands to black stained soil at the point of collection (0-2").</p> <p><u>Rationale:</u> Sample was collected to determine the hazardous constituents in on-site soil at this location.</p>

Table 1: Sampling Location, Description and Rationale
(Continued)

<u>Sample Number</u>	<u>Type</u>	<u>Location/Description/Rationale</u>
CS-SB-06	Soil	<u>Location</u> : This sample was collected from the NE region of the site in an area of heavily stained soil. Located next to an Air Force tanker (composite). <u>Description</u> : Soil texture ranged from black sands to yellow sands at the point of collection. <u>Rationale</u> : Sample was collected to determine the hazardous constituents of on-site soil at this location.
CS-SB-08	Waste	<u>Location</u> : A sample was collected from the Air Force labelled tanker. <u>Description</u> : Sample contained a dark yellow/green liquid and sludge-like material. <u>Rationale</u> : Sample was collected to determine the hazardous components of the waste in the tanker.
CS-PW-01	Private Well	Background sample was collected from upgradient well located NE of the site to determine background constituents of groundwater.
CS-PW-02	Private Well	Sample was collected from a down-gradient well located NE of the site to detect contamination.

(Ref. 18).

C. Analytical Results

Soil and groundwater samples collected during the Site Screening Investigation were analyzed by CompuChem Laboratories. SCDHEC Bureau of Laboratories analyzed the one waste sample collected from the C & S Waste Oil site. A summary of analytical results is given in Tables 2-4.

Laboratory analyses of soil samples collected from area of stained soil and near drum storage areas have shown above background concentrations of polynuclear aromatic hydrocarbons, heavy metals, semi-volatile organics, and volatile organic compounds. Aroclor 1260 (a PCB), 4-4'-DDT, lead,

trichloroethene and tetrachloroethene are among the contaminants detected in on-site soil samples. Groundwater sample CS-PW-02 collected from the nearest downgradient private well shows above background concentration of heavy metals and volatile organic compounds. Trichloroethene and tetrachloroethene are among the contaminants detected. Additionally, the waste sample analyzed by SCDHEC contained semi-volatile compounds such as dichlorobenzene, dichlorophenol and naphthalene. The significance of these results are discussed in the appropriate migration pathway. Complete analytical results are given in Appendix B.

TABLE 2: Summary of Soil Samples Analytical Results

Parameter (ppm)	C & S Waste Oil					
	CS-SB-01 (Background)	CS-SB-02	CS-SB-03	CS-SB-04	CS-SB-05	CS-SB-06
Arsenic	[7.8]	3.4	[3.3]	[2.3]	[2.0]	[1.1]s
Barium	185	116	180	183	226	288
Beryllium	[0.87]	[0.55]J	[0.71]	[0.43]	[0.53]	[0.32]
Cadmium	-	2.0	4.4	2.9	6.1	38
Chromium	16*	26*	62*	187*	88*	75*
Lead	144N	446N	682N	438N	413N	729N
Vanadium	27	21	55	70	28	46
Nickel	[10]	23	24	29	22	45
Methylene Chloride	0.089B	0.026B	0.014B	0.017B	0.051B	0.012B
Acetone	0.009BJ	0.015B	0.012BJ	0.012	0.019B	-
Chloroform	0.005B	0.002J	0.002J	-	0.28J	0.001J
2,4-di-methyl-phenol	-	0.051J	-	-	0.28J	1.35
Di-benzo-furan	0.18J	-	-	-	0.41J	-
Benzoic Acid	0.49J	0.24J	0.36J	0.45J	-	-
Naphthalene	0.48	-	0.086J	-	0.525	-
2-methyl-naphthalene	0.75	-	0.14J	-	1.35	-
Phenanthrene	0.38J	0.073J	0.22J	0.057J	1.9	0.43J
Fluoranthene	0.14J	-	0.17J	0.54	-	0.28J
Pyrene	0.14J	-	0.3J	0.61	1.6J	0.35J
Benzo (a) anthracene	0.1J	-	0.21J	-	1.3J	-
Chrysene	0.16J	-	0.35J	0.38J	2.3	0.38J
Bis (2-ethylhexyl) phthalate	-	0.14J	-	-	0.71	-
Butylbenzyl-phthalate	-	-	0.29J	-	0.84J	0.59J

TABLE 2: Summary of Soil Samples Analytical Results

C. & S Waste Oil
(Continued)

Parameter (ppm)	CS-SB-01 (Background)	CS-SB-02 (continued)	CS-SB-03	CS-SB-04	CS-SB-05	CS-SB-06
Benzo (b) fluoran- thene	0.26JX	-	-	0.43X	1.5JX	0.22JX
Benzo (k) fluoran- thene	0.26JX	-	-	0.43X	1.5JX	0.22JX
Benzo (a) pyrene	0.575	-	-	0.38J	2.1	0.22J
4,4'-DDE	0.025	-	-	-	-	-
4,4'-DDT	0.041	-	0.055	-	-	-
1,8-Dimethyl- naphthalene	0.87J	-	-	-	-	-
2,6-Dimethyl- heptadecane	1.0J	-	-	-	-	-
2,6-Dimethyl- heptadecene	2.1J	-	-	-	-	-
Heptadecane	1.3J	-	-	-	-	-
Hexatria- contane	1.1J	-	-	-	-	-
Pentacosane	3.1J	-	-	-	-	-
Hexachloro- benzene	-	-	-	0.18J	2.6	0.46J
Trichloro- ethene	-	-	-	-	0.019	-
Benzene	-	-	-	-	0.003J	-
Tetrachloro- ethene	-	-	-	-	0.021	-
Toluene	- 6 ug/kg	-	-	-	✓ 0.028	-
Ethyleben- zene	- bu	-	-	-	✓ 0.028	-
Total xylene	- 6 ug/kg	-	-	-	✓ 0.028	-
1,2,4-Tri- chloroben- zene	-	-	-	-	0.41J	-
Acenaphthylene	- 430 u	-	-	-	0.27J	-
Acenaphtene	-	-	-	-	0.2J	-
Anthracene	- 430 u	-	-	-	0.2J	-
Fluorene	- 430 u	-	-	-	0.56J	0.31J
Indeno (1,2,3-cd) pyrene	- 430 u	-	-	-	0.29J	1.9U

2.D. 14: PP. 311

TABLE 2: Summary of Soil Samples Analytical Results

C & S Waste Oil (Continued)						
Parameter (ppm)	CS-SB-01 (Background)	CS-SB-02 (continued)	CS-SB-03	CS-SB-04	CS-SB-05	CS-SB-06
X Di benzo (a,h)	4300					
anthracene	-	-	-	-	0.39J	1.9U
X Benzo (g,h,)	440					
perylene	-	-	-	-	1.3J	1.9U
Aroclor 1260	-	-	-	-	-	1.1

- * duplicate analysis is not within control limits
- [] value greater than or equal to instrument detection limit but less than the contract-required detection limit.
- J estimated value
- X isomer
- U analyzed for but not detected
- analyzed for but not detected
- B found in associated blank
- N spiked sample recovery not within control limits

TABLE 3: Summary of Private Well Samples Analytical Results

C & S Waste Oil		
Contaminant Detected (ppm)	CS-PW-01 (background)	CS-PW-02
Barium	[0.043]	[0.071]
Lead	0.018	[0.0044]
1,1-Dichloroethene	-	0.001J
1,2-Dichloroethene	-	0.001J
Typo: 1,1,1-trichloroethene	-	0.012
Trichloroethene	-	0.001J
1,1,1-tetrachloroethene	-	0.066

- J are estimated values
- [] value greater than or equal to instrument detection limit but less than the contract-required detection limit.

TABLE 4: Summary of Waste Sample Analytical Results
C & S Waste Oil

Contaminant Detected (ppm)	CS-SB-08 (Waste)
-1,2-Dichlorobenzene	2,040
-1,4-Dichlorobenzene	188
-2,4-Dimethylphenol	19,500
-Phenol	27,000
X Naphthalene	458
-4-methylphenol	20,700
X Gasoline	567
# 2 Fuel Oil	81.8

IV. GROUNDWATER PATHWAY

A. Regional Hydrogeology

C & S Waste Oil is located in the Inner Piedmont Belt of the Piedmont physiographic province. This province generally consists of igneous and metamorphic bedrock and saprolite (weathering products of bedrock). In this region, groundwater usually occurs in fractured bedrock and in the overlying saprolite. The overlying saprolite aquifer (soil-saprolite aquifer) is interconnected with the bedrock aquifer (Igneous and Metamorphic Bedrock aquifer) (Ref. 6). The interconnected saprolite and bedrock units make up the aquifer of concern (Ref 6).

Site specific data gathered by the Division of Hydrogeology (February 9, 1989) has determined that the fractured bedrock is the primary aquifer utilized by private well owners (Ref. 7). The fractured bedrock has an estimated hydraulic conductivity of $>10^{-3}$ cm/sec and is overlain by a ten to thirty foot thick mixture of silty sandy clay and clayey sands (ref. 8). The overlying material has an estimated hydraulic conductivity of 10^{-3} to 10^{-5} cm/sec (Ref. 8). The depth to groundwater is estimated to be between twenty and thirty feet. The direction of groundwater flow in the surficial unconfined aquifer appears to be toward the east (Ref. 8). The direction of groundwater flow in bedrock aquifers is unpredictable and unknown at the C & S Waste Oil site (Ref. 19). The site is located on a local topographic high that is potentially a recharge area (Ref. 8). The aquifer of concern has a reported yield of 30 gallons per minute. Karst topography is not known to occur within four miles of the site.

B. Groundwater Use

A well inventory within a radius of four miles of the site reveals the following uses of groundwater from the aquifer of concern: Community,

domestic, irrigation and industrial water supply. The well inventory lists Piedmont Rural Water as operating a public supply well 2.75 miles north-northeast of the C & S Waste Oil Site. According to John Border with Startex-Jackson-Wellford-Duncan Water District, this public supply has ceased operations and its services have been incorporated by the Startex-Jackson Wellford-Duncan Water District (SJWD). However, the Piedmont Rural Water is maintained to serve as a back-up system in case of emergencies (Ref. 20). The SJWD Water District is supplied water from a surface water intake operated by Spartanburg Water Systems.

An estimated 493 domestic wells located within three miles of the site provide drinking water to approximately 1,873 people (estimation based on 3.8 persons per household) (Ref. 2). Within four miles of the C & S Waste Oil Site, an estimated 2,934 people are dependent upon groundwater (Ref. 2). The nearest groundwater well is located approximately 200 feet east-northeast of the site (Ref. 2 & 8). However, three abandoned wells are located on-site. The S.C. Water Resource Commission-Subsurface Hydrogeologic Information System indicates that the screen depth of domestic wells within the area ranges from 25 feet to 318 feet below the surface (Ref. 9).

According to the previously mentioned well inventory, W.P. Brown operates an irrigation well approximately 3 miles (2.8) northwest of the site. However, Spartanburg County and Greenville County-Clemson Extension Agents do not have any information regarding W.P. Brown's irrigation well. Additionally, W.P. Brown of Greer is not listed with directory assistance. Therefore, no information regarding the acres irrigated is known.

C. Ground Water Impact

Groundwater samples collected, during the Site Screening Investigation, from the nearest downgradient private well shows 0.066 mg/l of tetrachloroethene and 0.012 mg/l of 1,1,1-trichloroethane (Ref. 10). These contaminants were not detected in the background private well sample. Although the data suggests that the groundwater aquifer has been impacted by the aforementioned contaminants, the integrity of the downgradient well has been questioned due to the proximity of randomly arranged rusted, crushed drums to the well. According to Judy Canova, these drums were similar in appearance to those on the C & S Waste Oil site and located 10 to 20 feet from the well (Ref. 21). However, the detection of contaminants in both on-site soil and groundwater samples suggest that C & S Waste Oil is the source of groundwater contamination. The estimated 1,873 people depending on groundwater wells that are located within three miles of the site are potentially threatened by the migration of hazardous waste from the site.

V. SURFACE WATER PATHWAY

A. Regional Characteristics

The C & S Waste Oil Site is located 895 feet above mean sea level. The site is relatively flat but positioned on a topographic high. The site slopes predominately to the northeast. The site slope is estimated to be 1.8 percent. The intervening terrain slope is approximately 9% (Ref. 2 & 12). Surface water runoff is expected to drain along the intervening slope into an unnamed tributary of the South Tyger River. The unnamed tributary is located 528 feet northeast of the site (Ref. 2).

Surface water runoff is facilitated by precipitation. The region receives an average annual total precipitation of 48 inches (Ref. 22). The one-year 24-hour rainfall ranges from 3.5 to 4.0 inches. The two-year twenty-four hour maximum rainfall intensity expected in Spartanburg County is 3.9 inches (Ref. 23). Because the site is positioned on a topographic high, the upgradient drainage area for the site is negligible.

Within four miles of the S & S Waste Oil Site, streamflow characteristics in the unnamed tributary stream and in the South Tyger River are unknown. A gaging station, located approximately 12 miles downstream in the South Tyger River near Reidville, recorded an average streamflow of 160 cubic feet per second for the River (Ref. 13). Additional streamflow measurements in the area suggest that stream flow near the site may range from 103 to 235 cubic feet per second (Ref. 13).

B. Surface Water Use

The majority of the population within four miles of the C & S Waste Oil Site are supplied drinking water from municipal water systems. These municipal systems (Town of Lyman, Town of Greer and Startex-Jackson-Wellford-Duncan Water District) draw surface water from intakes that are either located upstream, or within a different watershed. No public supply, industrial or agricultural surface water intakes are located within fifteen miles downstream of the C & S Waste Oil Site (Ref. 14). The nearest surface water intake is located approximately 7 miles upstream in the South Tyger River at Lake Cunningham and is operated by the Town of Greer (Ref. 15).

According to Roy Todd with the South Carolina Soil Conservation Office, a very limited amount of fishing is done in the South Tyger River (Ref. 16). Freshwater wetlands do not occur within four miles of the site (Ref 2). No federally designated endangered species or species of regional concern have been reported within 15 miles downstream (Ref. 16).

C. Surface Water Impact

No surface water samples were collected during the Site Screening Investigation due to the limited use of surface water within 15 miles downstream of the site. Additionally, large areas of stained soil at the site and the closeness of private wells offered greater potential for detection of contamination.

VI. AIR PATHWAY

Because air monitoring and sampling have not been conducted at the C & S Waste Site, the impact of hazardous materials stored and spilled at the site on ambient air quality has not been determined. However, the potential is high for gaseous vapors to be emitted from the old storage tanker and contaminated soil due to the volatile and semi-volatile characteristics of hazardous substances observed in samples collected from the site.

The nearest residence is located approximately 200 feet east-northeast of the site (Ref. 2). The following table gives an estimation of the population distribution within two miles of the C & S Waste Oil Site:

Table 5: Population Distribution Estimates

<u>Radius (Miles)</u>	<u>Population*</u>	<u>Cumulative Total</u>
0.25	49	49
0.50	175	224
1.00	562	786
2.00	6,346	7,132

*Population estimates are based on USGS topographic maps and census information.

(Ref. 2 & 5).

According to USDA Soil Survey-Spartanburg County Farmland Map, prime agricultural land is located approximately 400 feet south of the site (Ref. 4).

VII. ON-SITE EXPOSURE PATHWAY

A. Direct Contact Mode

It is unknown (documentation is not available) if contact with hazardous substances at the C&S Waste Oil Site has caused injury, illness or death to humans. However, the potential for direct contact with hazardous substances stored and spilled at the site exists because the site is unfenced. Although anyone can gain access to the site, individuals cleaning up the property for Hilltop Auto Parts are potentially at greater risk of exposure.

Soil Samples collected during the February 8, 1989 sampling inspection reveal that on-site soil contamination exist at the C and S Waste Oil site. A comparison of the level of contaminants observed in a background soil sample to contaminants detected in five on-site samples is summarized in Table 2.

Concentrations of the thirty-eight contaminants listed in Table 2 have been observed at above background levels in on-site soil samples collected from the C & S Waste Oil site. Therefore, past waste disposal practices at the site have impacted the environment and may threaten the health of individuals exposed to the hazardous constituents. The potential for direct contact with hazardous substances observed at the site exists because the site is unfenced.

Although buildings located at the C & S Waste Oil site were unoccupied (abandoned) during previous site visits, two houses and a service building located on-site are possibly restorable to an inhabitable state. An estimated 786 people live within a one-mile radius of the site (Ref. 2 & 12). No terrestrial sensitive environments are known to have their habitat at the site (Ref. 24). The nearest school is located approximate 7,920 feet (1.5 miles) west-northwest of C & S Waste (Ref. 2). A listing of child day care facilities published by the S.C. Department of Social Services indicates that there are 19 day care centers located in Greer, South Carolina (Ref. 25). According to Cindy Mason, SCDHEC Appalachia III District Consultant, Ms. Minda Sue Cudd operates a day care center within one mile of the C & S Waste Oil Site (Ref. 26).

B. Fire and Explosion Mode

Flammable and/or explosive chemicals such as ethenylbenzene, dichlorobenzene, dimethylphenol, phenol, methylphenol, gasoline and #2 fuel oil have been observed in the waste samples collected from the tanker-trailer (tank) abandoned at the site. Therefore, fire and explosive conditions are possible at the site.

VIII. Conclusions and Recommendations

As a result of the the Site Screening Investigation, it has concluded that on-site soil contamination has resulted from past waste handling practice at the C & S Waste Oil site. Furthermore, the detection of trichloroethane and tetrachloroethene in on-site soil and in a downgradient private well suggests that hazardous substances spilled at the site have impacted the groundwater aquifer. The migration of tetrachloroethene, a known carcinogen, and possibly other hazardous substances into the groundwater aquifer poses a health threat to the estimated 1,873 people depending on groundwater wells located within three miles of the site. Additionally, Aroclor-1260 (PCB's), dichlorodiphenyltrichloroethane (DDT), benzo [a] pyrene and other polynuclear aromatic hydrocarbons and heavy metals observed in on-site soil may adversely affect individuals entering the unfenced site.

The C & S Waste Oil site is given a medium priority for a Listing Site Inspection (LSI) because on-site and off-site contamination needs to be evaluated to determine if remedial and removal actions are necessary to prevent further release of hazardous substances into the environment.

LSIs are done to get a site on the NPL
not to determine if remedial/removal
actions are necessary

During the LSI, groundwater monitoring wells should be installed and sampling should be conducted to determine if groundwater contamination within the area is directly attributable to the site. Additional soil samples and stream samples should be collected as required under the LSI.

Due to the high concentration of volatile organic compounds detected in the on-site tanker, immediate removal of the tank is recommended. The C & S Waste Oil site has been referred to SCDHEC Bureau of Solid and Hazardous Waste Site Engineering Section for evaluation as a possible candidate for immediate removal action.

Missing
Refs.
(4), 11
24

IX. References

1. SCDHEC -Correspondences

January 13, 1988 letter from King, Cothran & Gray - Attorneys at Law to SCDHEC concerning the Estate of Haud Columbus Shaffer.

January 19, 1989, Record of Communication - Phone conversation between Gerald Stewart and Cindy Mason of SCDHEC regarding information gathered by Cindy Mason from Spartanburg, County Tax Assessor Office concerning ownership history of the C & S Waste Oil site.

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Copies attached.

2. U.S. Geological Survey-Greer, Taylors and Wellford Quadrangles; 1983 provisional editions. Copy attached.
3. Population figures estimated from the U.S. Bureau of the Census completed by: S.C. Division of Research and Statistical Services May 12, 1989. (CERCLA Files). Copy attached.
4. U.S. Department of Agriculture; Farmlands Map for Spartanburg County (CERCLA Files).
5. Record of Communication, phone conversation from Gerald Stewart with Charles H. Gray Spartanburg County Extension Agent, concerning agricultural use of land. May 3, 1989. Copy attached.
6. Hydrogeological Report of the C & S Waste Oil Site. Completed by Judy Canova on April 25, 1988 (CERCLA File).
7. Canova, J., "Periphery Inspection/Sampling Recommendations", SCDHEC Division of Hydrogeology. February 9, 1989 (CERCLA File).
8. Hydrogeological Review of the C & S Waste Site, Completed by Judy Canova on March 9, 1989 (CERCLA File).
9. S. C. Water Resource Commission, Surface/Subsurface Hydrogeological Information System. Inventory of Wells located within four miles of the C & S Waste Oil Site. Copy attached.
10. SCDHEC-Division of Hydrogeology, Groundwater Sampling Report for the C & S Waste Oil Site Screening Investigation. Completed by: Judy Canova March 10, 1989. Copy attached.
11. Sittig M., Handbook of Toxic and Hazardous Chemicals and Carcinogens, 2nd Edition, Noyes Publication 1985. pp. 843-845 and 879-881.
12. Calculation Data Sheets. Copy attached.

13. South Carolina Water Resource Commission, S.C. State Water Assessment Report #140. September 1983. pp. 164-166.
14. S.C. Water Resource Commission, Surface Water Treatment Plant Intakes (Map). Updated, February 9, 1988. Copy attached.
15. Record of Communication, Phone conversation between Gerald Stewart of SCDHEC and Jerry Balding of Greer Public Works Department concerning the location of Greer's surface water intake. May 10, 1989. Copy attached.
16. Preliminary Assessment of the C & S Waste Oil Site, Completed by: Gerald Stewart, 1989. pg. 3 Copy attached.
17. Sampling Reconnaissance Report, completed by: Gerald Stewart on May 11, 1989. Copy attached.
18. Sampling Trip Report, Completed by: Gerald Stewart on February 9, 1989. Copy attached.
19. SCDHEC - Division of Hydrogeology, Memorandum from Judy Canova concerning groundwater flow directions in bedrock aquifers, October 6, 1989. Copy attached.
20. Record of Communication, Phone Conversation between Gerald of SCDHEC and John Border of SJWD Water District concerning Piedmont Rural Water Company. November 9, 1988. Copy attached.
21. SCDHEC - Division of Hydrogeology, Memorandum from Judy Canova concerning the nearest downgradient well sample collected during the SSI of C & S Waste Oil, October 6, 1989. Copy attached.
22. Nus Corporation - Hazardous Ranking System Manual.
23. S.C. Water Resource Commission, Maximum Rainfall Intensity Expected at Center of Each South Carolina County. Copy attached.
24. South Carolina Heritage Trust County Search Program - Spartanburg County and Union County - Endangered Species and Species of Regional Concern. February 1989.
25. South Carolina Department of Social Services, "Listing of All Day Care Facilities on File," July 28, 1989. Copy attached.
26. Record of Communication, Phone Conversation between Gerald Stewart and Cindy Mason of SCDHEC concerning the location of daycare centers within one mile of C & S Waste Oil. October 10, 1989.